V.1 Call for Participation in the New IERS (1999)

Dear colleague,

The International Earth Rotation Service (IERS) is near to completeits 12th year of operation, an operation which has provided continuous improvements in the quality and time resolution of user products andin theaccessibility of those products for science and application. This was achieved thanks to new developments in space, computer and communications technology, but to a large extent also thanks to the outstanding efforts of many institutions and individuals contributing to the service.

Nevertheless, new developments in technology and modeling have significantly changed the situation from 1988 - when the service was created and the old Terms of Reference were established - until now. As a result and based on a general public evaluation and intensive discussions with the involved community, the IERS Directing Board decided in 1998 to reorganize the current operation and to come up with new Terms of Reference, satisfying current and near future requirements and taking into account new organizational structures of the space-observing techniques. These new Terms of Reference were approved by the Directing Board in March 1999 and the Board decided in a follow-on meeting to solicit proposals for participation in the various elements of the new IERS. A detailed description of the functions and duties of these elements is given in the attached material.

Your institution has directly or indirectly contributed to the activities of the IERS in the past and the importance of these contributions is herewith acknowledged and highly appreciated. We hope that the extended importance of the new IERS will encourage you to participate in one or even more elements of the service by responding to the attached Call for Participation.

Thanking you for your contributions to date and awaiting with interest your response to the Call for Participation I remain.

Yours sincerely,

Christoph Reigber
Chairman IERS Directing Board

CALL FOR PARTICIPATION IN THE NEW INTERNATIONAL EARTH ROTATION SERVICE (IERS)

Background

The International Earth Rotation Service (IERS), created by the IAU and the IUGG in 1987, started its activities in January 1988. IERS was given the mission to define and maintain a terrestrial reference system based on the most precise space geodesy techniques, to define and maintain a celestial reference system based on the directions of extragalactic radio sources and its tie to other celestial reference frames and to monitor the Earth's orientation. After ten years of activity it became necessary to reorganize it for various reasons: the re-organization of the new space techniques SLR, Lunar Laser Ranging, VLBI, and GPS into International Services (DORIS being now organized as a pilot program) and the development of a new component: the Global Geophysical Fluids (GGF) dealing with motions of the various fluid layers and their relationship with reference frames and earth dynamics.

Following discussions which took place at the IERS workshop in Paris in fall 1996 and during the "IERS retreat" held in Potsdam in September 1998, new Terms of Reference were formulated and adopted by the IERS Directing Board in March 1999.

The IAG and IAU were informed of these new Terms of Reference in Spring 1999.

Call for Proposals

The present IERS Directing Board solicits proposals for the various components of the new structure as laid down in the March 99 Terms of Reference. These Terms of Reference (ToR) and a more detailed description of the duties and functions of the various elements of the service are enclosed. The ToR can also be accessed via the IERS homepage at the following address:

http://hpiers.obspm.fr/webiers/general/iersq/TREF.html

This call for participation is open to all interested organizations or institutes. Proposals are being sought for:

– Product Centers:
  Earth Orientation
  Rapid Service, Prediction
  Conventions
  International Celestial Reference System (ICRS)
  International Terrestrial Reference System (ITRS)

– Combination Research Center(s)

– Analysis Coordinator

– Central Bureau

The IERS has no proper financial resources. Proposers must provide their own financial resources to support their proposal. The commitment of their organization will be an important consideration in the proposal review.

Proposal Instructions

Proposals for IERS Components should be submitted not later than 28 February 2000 to:

Christoph Reigber
GeoForschungsZentrum Potsdam
Telegrafenberg A 17
D-14473 Potsdam, Germany
phone:+49-331-288-1100
fax: +49-331-288-1111
e-mail: <reigber@gfz-potsdam.de>

with a copy to:

Daniel Gambis
Central Bureau of IERS
Observatoire de Paris
61 avenue de l'Observatoire
F-75014 Paris, France
phone: +33-1-4051-2229
fax: +33-1-4051-2291
e-mail: <gambis@obspm.fr>

The Proposal should be structured as follows:

– Cover Page (details below)
– Proposal Summary
– Description of Proposed Activities
– Management Proposal
– Financial Arrangements
– Curriculum Vitae of Proposer(s) with Relevant Publications

The Cover Page should contain the following information:

– IERS component referred to
– parent/funding organization
– name and title of authorizing official
– name and title of primary scientist
– mailing address
– phone/fax/email

– cooperating organisations/institutes
– signatures (the cover page should be signed both by the Authorizing Official committing the organization/institution to the IERS activity and the primary scientist involved)

Please send your proposal via postal mail to the above addresses. For easier distribution to the reviewers, an additional e-mail version should be made available (in ASCII or attached Word or WordPerfect file). Please send the email version to Christoph Reigber reigber@gfz-potsdam.de and Daniel Gambis gambis@obspm.fr

Proposals should not exceed approximately 20 pages.

Letter of Intent

A non-binding Letter of Intent is due by 10 December 1999. The Letter of Intent - use the form provided at the end - should state that you intend to submit a proposal. This letter should be addressed to Christoph Reigber, Directing Board Chairman, with a copy to Daniel Gambis, Central Bureau.

Proposal Schedule:

15 November 1999: Dissemination of the Call for Participation
10 December 1999: Deadline for letter of intent
28 February 2000: Due date for the proposals
April/May 2000: Evaluation of the proposals

Proposal Review

The IERS Directing Board augmented by external experts will review the proposals and make the selection at its Board Meeting in April/May 2000.

All proposers will be notified after this meeting.

ELEMENTS OF THE NEW IERS ORGANIZATION

[The sections concerning the Technique Centers are only included for information]

IGS Technique Center

The International GPS Service (IGS) acts as the Technique Center for the IERS in matters pertaining to the Global Positioning System (GPS), GLONASS and other global navigation satellite systems (GNSS) planned for the next decade. The IGS, which is supported on a volunteer basis by an international consortium of agencies, research institutions and universities, is comprised of a global network of roughly 200 GPS tracking stations, a number of ground

communication complexes, several network centers, three global data centers, seven analysis centers, and an analysis coordinating center for comparing and assessing data products from the analysis centers, and for improving and disseminating official IGS products. IGS scientific products include ephemerides for GPS satellites with both final and short-latency products, GPS tracking station positions, velocities and other ITRF-related products, Earth rotation parameter information, tropospheric water vapor distributions, ionospheric electron density distributions, and GPS satellite clock epoch and related timing information. The governance of the IGS is accomplished through the oversight provided by its 22-member Governing Board, the policies and standards of which are executed by the IGS Central Bureau (ICB). The ICB acts as the information center for the IGS. The ICB maintains documents relating to IGS standards and it publishes IGS technical reports and workshop proceedings. It also provides coordination for the operations and development of the IGS global network and for the ground communications and data systems infrastructure. Additional information is available at the IGS homepage http://igscb.jpl.nasa.gov

ILRS Technique Center

The International Laser Ranging Service (ILRS) provides global satellite and lunar laser ranging data and their related products to support geodetic and geophysical research activities as well as IERS products important to the maintenance of an accurate ITRF. For the IERS activities, the ILRS focuses on the tracking collected on Lageos-I, Lageos-II and the Moon. The ranging measurement is based on the time required for a laser pulse to make the round trip from the transmit site to the target and return. The ILRS uses the IERS Conventions. The ILRS collects, merges, archives and distributes Satellite Laser Ranging (SLR) and Lunar Laser Ranging (LLR) observation data sets of sufficient accuracy to satisfy the objectives of a wide range of scientific, engineering and operational applications and experimentation. The ILRS consists of about 50 tracking stations, four Operations Centers, three Analysis Centers, four Lunar Analysis Centers, 18 Associate Analysis Centers, two Global Data Centers and one Regional Data Center. Additional information is available at the ILRS homepage http://ilrs.gsfc.nasa.gov

IVS Technique Center

The Technique Center for VLBI is the IVS (International VLBI Service for Geodesy and Astrometry). Established in 1999 to intensify international VLBI cooperation and to assure delivery of high quality data products for Earth orientation and reference frames, the IVS

comprises 30 network stations, 3 operation centers, 7 correlators, 6 data centers, 18 analysis centers, 9 technical centers and a coordinating center. Because of the unique access of VLBI to the celestial reference frame, the IVS is recognized by the IERS as having singular responsibility to provide radio source positions for updating the ICRF and for defining new realizations of the ICRS. Similarly, the IVS provides unique measurements of long term UT1 and the coordinates of the celestial pole (nutation and precession). The IVS is responsible for coordinating global VLBI observations for geodesy and astrometry and assuring that analysis centers follow documented standards and data formats for the results to be used by the IERS. In future, the IVS shall provide self-consistent, combined EOP and reference frame products for the IERS and other users. Additional information is available at the IVS homepage http://ivscc.gsfc.nasa.gov

DORIS Technique Center

DORIS receivers are presently flying on three low Earth orbiting satellites. More DORIS-equipped satellites are expected in 2000, carrying upgraded equipment. The DORIS tracking network consists of 52 well-distributed permanent stations, a large number of them collocated with other IERS equipment, primarily GPS.

The DORIS system is presently managed by CNES, with the global data center at the CDDIS.

A Technique Center for DORIS is currently being organized as a Pilot Experiment within Commission VIII (CSTG) of the International Association of Geodesy. The purpose of this experiment is to initiate a large international cooperation on DORIS, providing in particular all IERS data necessary for obtaining IERS products and for conducting related scientific studies on station coordinates and velocities, station coordinate time series (weekly solutions), polar motion and length of day determinations. The long-term goal of this experiment is to create an International DORIS Service based on world-wide cooperation.

Additional information can be obtained at the following Web page: http://lareg.ensg.ign.fr/DORIS

Earth Orientation Product Center

The Earth Orientation Center is responsible for:

(1) Monitoring of long-term Earth orientation,

(2) Publications for time dissemination, and

(3) Leap second announcements

(1) Long-term Earth Orientation

Long-term Earth orientation parameters series are derived from the combination and integration of all available data in a consistent way. For recent data, this combination will be made using data which are made available after all of the final data are received from the Technique Centers. It is expected that this center would receive the final observational estimates from the Technique Centers, examine them for adherence to the IERS Reference Systems and Conventions, combine the data using state-of-the-art techniques, and make the final result available for publication. Results should also be sent to the Central Bureau which will make them available to users via its web/ftp site. A monthly schedule for the EOP computation process is envisioned but other cycles could be considered. The Center will be required to publish a detailed description of its procedure and document any changes.

(2) Time Dissemination

Publications for time dissemination refer to the announcements of the differences between astronomical and civil time (DUT1) for time distribution by radio stations. The Earth Orientation Center is expected to make available for publication the notices when appropriate.

(3) Leap second announcements

Similarly the notice of insertion of (or lack of) a leap second in UTC will be made by this Center. The Earth Orientation Center will evaluate the predicted behaviour of UT1-UTC and, using the guidelines provided by the CCIR, make announcements regarding leap second insertion as appropriate.

The Earth Orientation Center would be expected to interact closely with the Analysis Coordinator to guarantee long-term internal consistency of the Earth orientation data with the ITRF and the ICRF. The center will work together with the Analysis Coordinator and the Combination Research Centers to ensure that the operational combination procedure is optimal. Routine interaction with the Rapid Service/Prediction Center will be necessary to provide consistency of IERS Earth orientation data.

Exchanges between the center and the Technique Coordinators are commonly required in order to assure timely delivery of data to the Earth Orientation Center and to notify the Technique coordinators of any potential data problems. Direct contacts with Operational Analyses Centers providing individual solutions may take place in case of specific problems in their contributions.

A representative of the Earth Orientation Center will serve on the Directing Board for up to two four-year terms.

Rapid Service/Prediction Product Center

The IERS Product Center for Rapid Service/Prediction is responsible for providing Earth orientation parameters on a rapid turnaround basis, primarily for real-time users and others needing the highest quality EOP information sooner than that available in the final series published by the IERS Earth Orientation Product Center. The publications of the Rapid Service/Prediction Center must be fully consistent with and complement the publications of the Earth Orientation Center. It is expected that this center will receive observational estimates from the Technique Centers, especially rapid and preliminary series, examine them for adherence to the IERS Reference Systems and Conventions, combine the submissions using state-of-the-art techniques, and make the results available in a timely fashion. It is also necessary to develop reliable and robust prediction algorithms to extend the rapid service EOP series to future epochs. For the convenience of users requiring only modest accuracy, predictions should be made available up to one year in advance.

A regular publication schedule for EOP time series is envisioned for the Rapid Service/Prediction Center, with bulletins at least twice weekly. To satisfy the highest accuracy user requirements, such as for GPS orbit prediction, updated bulletins may be published as frequently as daily (or as often as justified by available observations). The Center will be required to provide detailed documentation of its procedures and to report any changes.

The Rapid Service/Prediction Center will be expected to interact closely with the IERS Analysis Coordinator to guarantee long-term internal consistency of the Earth orientation series with the ITRF and the ICRF, and with EOP series published by the Earth Orientation Center. This center will work together with the Analysis Coordinator and the Combination Research Centers to ensure that the operational combination procedure is optimal. Routine interaction with the Earth Orientation Center will be necessary to provide consistency of IERS Earth orientation results. Exchanges between this center and the Technique Centers are commonly required in order to assure timely delivery of data to the IERS and to notify the Technique Centers of any potential data problems.

A representative of the Rapid Service/Prediction Center will serve on the Directing Board for up to two four-year terms.

Conventions Product Center

The IERS Conventions Center is responsible for the maintenance of the IERS conventional models, constants and standards. The Center works under the guidance of the IERS Editorial Board that is se-

lected by the IERS Directing Board. The Conventions Center must interact closely with experts in the fields related to the appropriate models, constants and standards to propose new versions of the IERS Conventions to the Editorial and Directing Boards for approval and make them available for printed and electronic mail distribution. It is expected that a new version will be published approximately every three years and that updates, corrections, etc. will be maintained electronically. The Center will maintain electronically accessible files containing any software available for distribution to users.

A representative of the Conventions Center will serve on the Directing Board for up to two four-year terms.

ICRS Product Center

The IERS Terms of Reference specify that one of the primary objectives of the IERS is to provide the International Celestial Reference System (ICRS) and its realization, the International Celestial Reference Frame (ICRF).
In the future IERS structure, a Technique Center and a Product Center will share the task of maintaining the ICRS and the ICRF: the International VLBI Service for Geodesy and Astrometry (IVS) and the ICRS Center. There will be a close interaction between the Analysis Coordinator and the ICRS Center. Being an IERS Product Center, the ICRS Center will be represented in the Directing Board.

While the IVS is fully responsible for providing VLBI radio source coordinates for updating the celestial reference frame, the ICRS Center will be organized assuming the following responsibilities:

- In coordination with the IVS, the ICRS Center will maintain and extend the current ICRF. From astrometric results provided by the IVS as new data and analysis become available, the ICRS Center will periodically issue updated catalogs of the current ICRF. It will provide J2000 names for new sources and assure that such catalogs are consistent with the ICRF and the ICRS.

- The ICRS Center together with the IVS will provide parameters to quantify the astrometric quality of sources.

- The ICRS Center will have the responsibility of monitoring the links to other frames that permit the access of all users to the ICRS.

- In coordination with the IVS and the IAU Working Group on the International Celestial Reference System, the ICRS Center will prepare recommendations for each future ICRS realization, which upon adoption by the IAU would replace the then current ICRF. These recommendations would be on the basis of studies developed at

the ICRS Center and conducted jointly with the IVS.

- In coordination with other IERS Product Centers and the Analysis Coordinator, the ICRS Center will maintain the long-term consistency of the ICRF, ITRF and Earth orientation time series.

- The ICRS Center will coordinate with the IVS the data and information to be provided to the IERS Central Bureau and to the IERS Data Center for archiving and distribution.

A representative of the ICRS Product Center will serve on the Directing Board for up to two four-year terms.

ITRS Product Center

The ITRS Center is responsible for the maintenance of the ITRF as the realization of the ITRS.To fulfil this function, the ITRS Center must have a broad overview of the entirety as well as the constituent networks that form the ITRF. It promotes the connection and integration of these networks through technique collocations and accurate, documented local surveys. From geodetic input provided by the Technique Centers and/or individual Analysis Centers, the ITRS Center forms a combined ITRF, evaluates the results globally and at each individual point, and analyses discrepancies. The ITRS Center distributes the ITRF for public use and provides feedback to the Technique Centers, Analysis Centers, and local survey organizations. To advance the state of the art, the ITRS Center develops and evaluates rigorous combination algorithms and refines the conceptual basis of the ITRS. The ITRS Center works under the guidance of the IERS Analysis Coordinator to ensure the consistency of IERS reference frames and EOP.

A representative of the ITRS Product Center will serve on the Directing Board for up to two four-year terms.

Combination Research Center(s)

Combination Research Center(s) are required to develop combination procedures at two different levels: a) observation of the various techniques and b) data provided by the techniques contributing to the IERS. The center(s) develop recommended method(s), provide detailed description(s), and make the necessary software available to the Analysis Coordinator. The Center(s) provide recommendations regarding the implementation of the combination procedure to the Analysis Coordinator. The center(s) are expected to work closely together with each other and with the Analysis Coordinator. Suggested combination procedures must be well documented and thoroughly tested. Centers may assume that the Technique Centers will provide the necessary data for analyses and demonstrations

although innovations in analysis proceedings may also be necessary.

A person chosen from the representatives of the selected proposals will serve on the Directing Board for up to two four-year terms.

Global Geophysical Fluids Product Center

[This section is only included for information. No call for participation is issued at this time for the GGF as its structure is already in place.]

The Global Geophysical Fluids (GGF) Center was established by IERS on its 10th anniversary day January 1, 1998, in an effort to expand its services to the scientific community. Under the GGF Center, seven Special Bureaus (SB) were selected, each to be responsible for research activities relating to a specific Earth component or aspect of the geophysical fluids of the Earth system. They are: Atmosphere, Ocean, Ocean Tides, Hydrology, Mantle, Core, and Gravity/Geocenter. The GGF Center and the SBs have the responsibility of supporting, facilitating, and providing services to the worldwide research community, in areas related to the variations in Earth rotation, gravitational field and geocenter that are caused by mass transport in the geophysical fluids. The angular momenta and the related torques, gravitational coefficients, and geocenter shift will be computed for all geophysical fluids based on global observational data, and/or products from state-of-the-art models some of which assimilate such data. The computed quantities, algorithms and data formats are standardized. The results are archived and made available to the scientific research community.

Analysis Coordinator

The Analysis Coordinator is responsible for the long-term and internal consistency of the IERS products. He/she is responsible for ensuring the appropriate combination of the Technique Center products into the single set of official IERS products and the archiving of the products at the Central Bureau or elsewhere.

The Analysis Coordinator will monitor the Technique Center and Product Center activities to ensure that the IERS objectives are carried out. This is accomplished through direct contact with the independent Technique Center Analysis Coordinators or equivalent. Specific expectations include quality control, performance evaluation, and continued development of appropriate analysis standards. The Analysis Coordinator may commission in concert with the Technique and Analysis Center Coordinators certain measurement and analysis programs for the purpose of improving the accuracy and

consistency of IERS products. The Analysis Coordinator interacts fully with the Central Bureau and the Product Centers. The tasks of the Analysis Coordinator require at least a full-time position.

The Analysis Coordinator is a voting member of the IERS Directing Board and is generally selected every four years by the majority vote of the Technique Center's representatives.

Central Bureau

The IERS Terms of Reference specify that the Central Bureau (CB) is responsible for the general management and the coordination of the IERS. It collects data from the Technique Centers and also the products resulting from the Combination Research Center(s) and Product Centers to users via its Web/ftp site and electronic procedures. The CB disseminates to the user community the appropriate information on Earth-orientation and the terrestrial and celestial reference systems.

The Central Bureau manages the IERS activities in conjunction with the Analysis Coordinator, the Product Centers and the Combination Research Center(s). The CB coordinates the activities of the different IERS groups. It makes analyses of all IERS products in close cooperation with the Analysis Coordinator. Via its Web/ftp site and electronic mailing, it ensures the day-to-day interface with the user Community. It organizes and publishes an Annual Report, Technical Notes, Conventions and various other documents. It distributes by e-mail information on the daily activity of the IERS via mailing, newsletters, gazettes... It organizes dedicated campaigns, meetings and workshops. It acts as the executive arm of the Directing Board (DB), provides the secretariat for the DB, organizes the Board meetings and edits the meeting minutes. It is in charge of the interface with associate and corresponding members.

A representative of the Central Bureau will serve on the Directing Board for up to two four-year terms.